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AUTHOR	Downes, Toni
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ABSTRACT

This paper reports the results of a 3-year study of children's use of computers in their homes and examines the implications of such use for educators. Subjects were over 400 children between ages 5 and 12 who came from a variety of social, economic, and cultural backgrounds in urban Sydney (Australia). The study aimed to develop knowledge and understanding about the reciprocal relationship that develops between the child and the computer within the socio-cultural context of the home, and it aimed to inform the work of educators who are seeking to develop programs using computing technologies within schools. Social discourses surrounding children's use of home computers are explored in ways that elucidate the relationship between discourse and affordances. Children's conceptions of computers as a playable tool are highlighted. Considered is the co-agency of the relationship between the child and the computer for educators who want to incorporate children's ways of learning and achieve effective integration of computing technologies in the curriculum. Contains 24 references. (Author/MES)

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The computer as a 'playable' tool

presented at AERA 2000, New Orleans

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T. Downes

Dr Toni Downes
University of Western Sydney,
P.O. Box 555 Campbelltown, NSW 2560
Australia.
t.downes@uws.edu.au

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This paper reports the results of a three year study of children's use of computers in their homes and examines the implications of such use for educators. The study aimed to develop knowledge and understanding about the reciprocal relationship which develops between the child and the computer within the socio-cultural context of the home and it aimed to inform the work of educators who are seeking to develop programmes using computing technologies within schools. Social discourses surrounding children's use of home computers are explored in ways that elucidate the relationship between discourse and affordances. Highlighted is children's conception of computers as a playable tool. A discussion seeks to consider the co-agency of the relationship between the child and the computer for educators who want to incorporate children's ways of learning and achieve effective integration of computing technologies in the curriculum.

Introduction

In the early to mid-eighties, children were more likely to encounter a computer in their school than in their home. Today the reverse is more often the case. In the late 1990's, approximately 60% of Australian families with school age children have working computers in their homes (Australian Bureau of Statistics, 1998). Given current resource provision and curriculum practices in Australian schools, these children are more likely to use the computer in their homes than in their schools. Typically in Australian homes children use computers between 1 and 5 hours per week (Australian Bureau of Statistics, 1998), while in schools the duration is more likely to be closer to 30 minutes a week, if they use it at all (Downes, 1998b). Given that this trend of greater use and access in the home is likely to continue, it is important for educators to understand the nature and context of children's use of computers in the home.

This paper reports the results of a three year study of children's use of computers in their homes and examines the educational implications of such use. Previous studies have focused on the impact of game playing on children's social lives and educational achievements (Buckingham, 1993; Cunningham, 1994; Gottschalk, 1995; Sakamoto, 1994; Smith, Curtin, & Newman, 1995; Wober & Shchina, 1994), on the demographics, equity and social context issues of computers in homes (Apple

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Computer Australia Pty Ltd, 1996; Downes, 1997; Hirsch, 1992; Lally, 1996; Morley & Silverstone, 1990; Steinfield, Dutton, & Kovaric, 1989); or on children's patterns of leisure activities (Cupitt & Stockbridge, 1996; Livingstone & Gaskell, 1995; Sefton-Green & Buckingham, 1996). This study, draws these threads together, and looks at how children use the computer as a tool for work-related purposes in their homes and their schools. In particular, it focuses on how children come to view the computer as a "playable tool".

The study was situated within a post-structural, multi-disciplinary, theoretical framework. It drew on ecological psychology (Bronfenbrenner, 1992; Valenti & Good, 1991), cultural studies (Morley & Silverstone, 1990) and the newly emerging paradigm of childhood studies (James & Prout, 1990; Qvortrup, Bardy, Sgritta, & Wintersberger, 1994). Among the key concepts drawn from the various traditions were: childhood and technology as social constructions; children as active in constructing and determining their socio-cultural life within the home while simultaneously being constrained and enabled by the context they are helping to shape; the multifunctional domestic computer as offering a range of affordances shaped by its symbolic meanings and instrumental features; the home as a microsystem of the child, with its own socio-cultural practices, beliefs, gendered relations and resources. Within this framework, an affordance is the property of both the child and the computer, neither is privileged over the other. It refers to the perceived and conceived properties of a value-rich, socially-contextualised object (Valenti & Good, 1991).

Methodology

The study was multi-staged and multi-method. It began in 1995 and involved over four hundred children who regularly used a computer in their homes. The children were aged between five and twelve and came from a variety of social, economic and cultural backgrounds in urban Sydney. In Stage 1 the main data collection method was same-age, mixed-gender discussion groups. In Stage 2, 275 students were interviewed using a common set of questions. Stage 3 involved an in-depth study of 12 children, their parents and their teachers. The main data collection methods were computer-use diaries and semi-structured interviews with the children, parents and teachers. All discussion groups and interviews were recorded and transcribed. The structured interviews were also recorded on a form. A key feature of the design of this study was its emphasis on children's reliability as informants and constructors of knowledge about issues which affect their lives. Qualitative analysis involved the coding of data to reveal emerging patterns, threads, tensions and themes, with any quantifiable data also being coded and tabulated.

Results and Discussion

The main findings of the study were that children conceived of and used the computer as both a toy and a tool, and that when they were thinking of and using the computer as a tool, it was a 'playable' tool. Several different factors in children's experiences with computers combined to make the 'playable' tool a key affordance. These included: the socio-cultural context of children's domestic computing, family's and children's approaches to learning to use computer games as well as other software, and their overall patterns of use.

Socio-cultural contexts of children's domestic computing

In all homes, complex and subtle gender and socio-economic differences interacted with varying resources, parental discourses, family rules, parental and sibling expertise and patterns of family use, to create a range of computing experiences for children.

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Patterns of access were strongly influenced by parental expertise developed in the workplace and by family affluence. All children who participated in the study had access to basic hardware and software at home that could support game playing, word processing and drawing. In more affluent homes, children usually had access to the full range of peripheral devices, such as CD-ROM drives, printers or modems. In a significant number of these homes (14%) there was more that one computer. Children in less affluent homes were less likely to have access to the full range of peripheral devices, except where the home computer was a recent purchase and came as a package with all devices and a range of 'tool', game and educational software.

Children more often perceived that the computers in their homes were jointly owned by their family, rather than owned by an individual family member. Families in less affluent communities were more likely to have a computer perceived to be the child's or children's. In these less affluent homes, parents were less likely to use the computer for work-related purposes: generally the school-aged children were the main users. Children from more affluent families rarely, if ever, assigned themselves as owners of the family computer/s perhaps because their parents were more likely to be regular users of computers, particularly for work-related purposes. So in these homes, computers were either conceived as belonging to the parents or to the family.

Parents from all communities participated in a number of discourses when discussing the importance and place of computers and computing. These discourses were 'computers as the future', 'computers for education' and 'computers as personal productivity tools'. While children actively participated in these discourses, they added not unexpectedly, the discourse of 'computers as entertainment'. Parents accepted this role, but did not feature it in their discussions about why they brought computers into their homes. Surprisingly the discourses were not strongly gendered: computers were important for the future for both girls and boys, and accepted as entertainment for both.

When talking about the computer as a personal productivity tool, parents and children spoke about the work-related tasks of writing and accessing information and explained how the computer makes these tasks less arduous. They believed that using computers makes it easier and quicker to access information, easier to edit (due to surface features such as spelling, punctuation, grammar) and easier to make work look better. When discussing how writing could be improved through the use of word processing software there was a strong focus on the 'look' of texts rather than the quality of the writing itself. In this sense, word processors seemed to relate to form rather than function. Such an affordance was shaped by both the features of the software environment itself and the way children (and possibly parents) approached writing tasks.

Similarly, when accessing information either from a CD ROM or the Internet, children described the ease of use compared with books and libraries and also how much more interesting than print, were electronic forms of information. With the processes of researching topics or questions, the affordances of computers related to 'getting information' quickly, rather than involvement in the more cognitively demanding tasks of making sense of information and incorporating it into knowledge.

This construction of the computer as a tool that makes things 'easier' for the children created real dilemmas for many parents and teachers. From their perspective, a danger arises if children become over-reliant on the tool aspects of the computer, while still in the process of mastering traditional skills such as handwriting. In speaking about children's access to electronic forms of information, parents and teachers were not so much concerned with the matter of losing more traditional library

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and book skills, but rather with losing an appreciation of print-based technologies and with losing the preparedness to put in the effort which the older technologies demanded.

Both boys and girls spoke extensively about the importance of computers as a source of entertainment in their homes. Game playing was seen as an active form of leisure where the process of trying to win or of winning, was pleasurable. The children believed that game playing could develop some useful computing skills and that there was educational value in games which involved them in learning basic skills such as reading, maths, spelling and general knowledge. Only two parents of the twelve families commented negatively about game playing, implying by comments like "I do not want them to use it as a toy" that they wanted the computer to be viewed by the children as a tool. The parents who were happy with their children playing games were comfortable with the family computer being used as both 'toy' and 'tool'. They generally encouraged 'tool use' while permitting 'toy use' within limits.

In both more and less affluent homes, family rules also generated a 'hierarchy' of legitimate use, defining who was allowed to use the computer, for how long and for what purposes. Priority access was generally given to those wanting to 'work' over those wanting to 'play' and older family members had priority over younger ones. The most common family rule was limited time for game playing on the computer because of the time consuming nature of this activity. These family rules provided a strong indication to all children that computers were for 'work' as well as 'play'. They also interacted in particular ways with family discourses and children's patterns of use to produce important outcomes for girls. Girls' preferred activities were more closely aligned with parent's priorities and these preferred uses were accorded higher status than was game playing.

The discourses and patterns of use combined to reinforce the potential affordances stemming from the functional identity of the computer. The affordance of 'tool' was strengthened through the dominant discourses, the rules regarding priority use and the actual patterns of use of parents and older siblings. The affordance of 'toy' was legitimated by parental approval if not active participation in the discourse of computers as entertainment. It is important to note, though, that this approval in some families was somewhat restricted by concerns about the time consuming nature of game playing. The legitimation process was also supported by parental and sibling game playing, though such game playing was gendered, and in the case of parents, was strongly related to community affluence.

It is through these processes, that the affordances of 'toy' and 'tool' co-exist for children in the home. This notion of co-existence is a significant finding. Much of the earlier literature in the discourses surrounding domestic computing spoke in terms of competing discourses (Haddon, 1988a; Murdock et al., 1992). This study has found that while being shaped differently through the interactions of the discourses and patterns of use, both affordances are legitimate conceptions of the home computer and are perceived as such by both parents and children.

Children's ways of learning

Children's patterns of learning to play games and use other software were relatively similar across age, gender and family background. Some differences occurred in the initial stages of learning to use the computer where boys were more likely to "fiddle" and girls were more likely to seek help through asking others, reading the manuals and looking up help files. After initially learning to operate the computer, virtually all boys and girls improved through "fiddling", "mucking around" and "just doing it". The outcome was that children conceived of the computer as an environment where the

combination of exploratory learning and learning by doing worked well for them.

Children described in detail how they played and learned to play games. When 'getting better at' games and using software such as word processors, children did not separate out performance from practice or play. The distinction between performance and practice was blurred: children learned from playing and played to learn. They 'learned on the job' in playful ways. This type of learning was afforded by the interactive and visual nature of computer activity. When referring to gaming contexts, children spoke about learning through seeing the consequences of their actions, through visual (and sometimes auditory) feedback. Similarly, with word processing and drawing software, children spoke about doing and seeing what happened in both the literal and figurative senses.

Children's home computing environments varied in the degree of human support and expertise available to children who were learning. Opportunities for spectatorship and apprenticeship within the family were mainly available to children through older siblings. Approximately 60% of children in Stage 2 of the study reported that one or both of their parents used a computer in their workplace and many of these parents were reported to complete work tasks at home using a family or personal computer. Adults and siblings supported children's learning by providing help, advice, mentoring and modelling but rarely engaged in didactic teaching. They generally allowed children the space to develop their own expertise and their own approaches to learning about and with computers. A reciprocal relationship between child and computer was able to develop without significant adult interference. Parents 'allowed' rather than 'encouraged' children to play games and so they contributed only to the teaching and learning when asked to do so and this was usually only in the early stages of learning the computer's operations or learning a new game.

The modes of learning by doing and exploratory learning, while accepted as natural and appropriate for young children's informal learning are much less accepted in the older child's world, especially in those environments that are governed by rules, such as educational settings. Computer game playing provides one environment where children can continue to use these processes into middle childhood and adolescence. Gaming contexts were viewed by children as adult-free computing zones where they set their own goals and were in control of their own strategies. Adults were not seen as 'resident' experts in the skill/knowledge domain of the games, the processes of playing or the processes of learning and improving game performance.

Patterns of Use

Patterns of use within the home were strongly gendered and related to age. Children from more affluent homes were more likely to see parents and other adults using the computer, particularly for work-related purposes. In families where only one parent used the computer, it was more likely to be the father. Siblings were also significant users of the computer in the home. While most siblings were seen to play games, older siblings were also seen to mainly use the computer for tasks such as college or university work, school work, home work and projects. Again gender differences were evident with game playing being reported as the predominant activity for brothers and a combination of both school work and game playing for sisters.

There were also gender and age differences in the patterns of use of the children themselves. Overall game playing was the most common activity. Boys played games more often and for longer periods than did girls. Boys were also more likely to play games that were borrowed, shared or purchased. Girls were more likely to play games already installed on the computer. This difference provides some insight into the differences found between boys' and girls' interest in the operating system and

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technical specifications of their computer. Boys who shared and bought games needed to know about the compatibility of the game and their operating environment.

Both boys and girls spoke about the pleasure of playing games in terms of the challenge, the creativity, the unexpectedness, the discovery, the choices, the excitement, the complexity and overcoming the obstacles. It is interesting to note that many of the processes of game playing that children described, relate to cognitive performance: challenge, complexity, choice and creativity. Overall, the preference for these cognitive processes was not gendered nor related to the community from which the children came.

As well as playing games, girls and boys engaged in a wide range of other computer-based tasks. The common tasks were drawing, writing, looking things up and making things such as cards, posters and banners. Less common tasks included manipulating sound and images, communication by email, designing and making newsletters and stationery, searching the Internet for information related to leisure pursuits or for software to download, and listening to music through the computer's CD system while using the computer. These tasks have been grouped into four categories and are listed in Table 1.

Table 1: A Classification of children's non-game-playing activities

Activity	*Creating texts*	*Using texts*	*Communicating*	*Using technical processes*
*Tasks**	composing writing editing writing decorating writing constructing images manipulating images designing texts with words and images making texts with words and images *creating sounds* *manipulating sounds* *integrating writing, images and/or sounds*	locating browsing searching viewing, listening and/or reading using organising	*phoning* *emailing* *chatting in chat room* *chatting one to one* *role playing* *joining an interest group* *searching for people with particular characteristics* *sending greeting cards etc*	booting the computer shutting down the computer running software loading files saving files printing files managing files customising software fixing problems *recording sounds* *scanning/digitising images* *dialling and connecting to network service* *downloading from network* *altering desktop features* *installing software* *altering system configuration*

* normal print represents common tasks, *italics* represents less common tasks.

These activities performed two distinct functions. Some were leisure activities generated by the children for their own or others' pleasure. The remainder was work-related. Leisure-related activities were further subdivided into playful and purposeful tasks. Figure 1 shows the relationship between the nature and purpose of the tasks.

Within this framework an episode of game playing could be playful, in the sense of 'fiddling around' to find out more about a particular place or event within the game or just playing 'for fun', or purposeful, in terms of 'beating my dad'. Using information texts could be playful, as in 'surfing' CDs or the WWW or purposeful, in terms of looking up a favourite pop group. Work-related activities for the children in this study were purposeful tasks which were usually connected with school-work. Within these purposeful tasks, children engaged in playful episodes which were often

the result of being distracted, taking time out to 'check out' or 'figure out' something, or merely to 'enjoy' or 'play' along the way. This ability to shift backwards and forwards from work and play as needed, basically allowed them to complete purposeful tasks through playful means. Comments from children such as "I can play Paintbrush', "I played typing stories" and "I played Encarta" illustrate this. The use of the word "play" here can be viewed like 'playing a musical instrument', referring to the skilful use of the features of the computing software. Through episodes of purposeful leisure-related and work-related activities, these became 'playful' experiences for the children. These factors combined to create, in the minds of the children, an affordance of the computer as a playable tool.

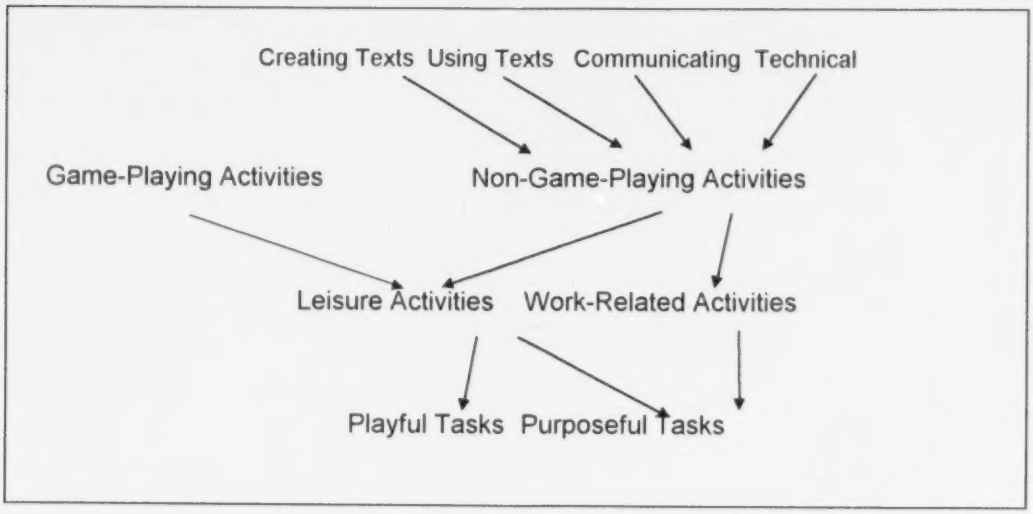

Figure 1: A framework of children's uses

This conception of the computer has a number of interesting consequences. One relates to children who regularly used computers for personal and work-related writing. Playful episodes involved children in playing with the 'look' of the text rather than its meaning. By using WYSIWYG word processors children could see the direct results of their various formatting commands, and the act of improving the look of the text became integrated into the composing process. Given the obvious and immediate feedback on the look of the text, it is not surprising that when combined with children's approaches to learning and using, a dominant affordance emerged, namely word processors are for improving the 'look of' the text. This predisposition to use word processors in particular ways, needs to be carefully considered when educators plan to use computers in the teaching and learning of writing.

Similarly, children's predisposition to use and learn to use computers in particular ways, has an impact on their use in educational settings. For the majority of children in the study, their sense of control over their computing activity at school was severely limited compared with that at home. They spoke of being told 'not to fiddle' and 'if you have a problem - ask - don't try and fix it yourself'. They also spoke of having limited time to use computers at school, with rarely enough time even to finish substantial tasks in one sitting. The practice of playing an educational game only once was in stark contrast to the way children learned at home and it denied them the opportunity of

'getting better' through an integrated mode of performance, practice and play. Given that children's access was restricted to a weekly session of 20-30 minutes duration in the majority of schools, the question is raised about the role of educational games in the classroom. The improvement of performance through repetitive play was not considered viable by most teachers.

Computing experiences at school were either heavily teacher-directed in order to achieve syllabus outcomes in the key learning areas, or were at the other extreme of incidental game playing during free time. In contrast to home, children were not allowed space to develop their own expertise or learning strategies. Little genuine integration of various technologies into units of work occurred and tokenistic computing involved activities such as using the word processors to type up information reports and stories. Teachers and children who were interviewed justified word processing as an easier and better way for children to present work. The perceived disadvantages of using word processors were also in line with parents' views about lost skills, lost motivation and effort.

It was evident that the belief systems of individual teachers strongly influenced how computers were used in classrooms. Many teachers still considered computing to be a marginal activity with many unresolved pedagogical and technical issues. Some of the teachers who were interviewed were able to rationalise that computer use was not essential for present societal functioning and focused strongly on the ability to use technology in the future world of work.

Conclusion

The emergence of the computer's affordance as 'playable', and children's own predisposition to use and learn to use computers through exploratory learning and 'learning by doing' demonstrate the co-agency of the relationship between the computer and the child. They interact in reciprocal ways, to re-shape both affordance and use. Through these interactions a number of approaches to learning are further reinforced. These include exploratory learning and the merging of the processes of play, learning and working. Pathways to playful learning and working were created through the interaction of exploratory learning and the interactive nature of the computer. The computer helps children to extend their exploratory skills and approaches beyond the traditional 'early childhood' years.

The blurring of the processes of play, learning and working can be viewed in a positive light. However, it needs to be situated within the context of providing a strong contrast to the dominant pedagogical approaches in schools that continue to separate learning and doing, or practice and performance. This creates tension where educators employ computers and related technologies within traditional curriculum and pedagogical frameworks and when children find that their preferred learning strategies are discounted or denied authenticity within the classroom. This discontinuity between the learning affordances of the computer and the traditional pedagogies of classrooms cannot continue to be ignored by educators. As more and more children use this technology in their homes and develop predispositions, skills and understandings within particular ways of learning, the gap between learning with the technology and learning at school becomes wider.

If children who regularly use computers in their homes come to school with different orientations to learning and different sets of orientations to traditional texts, literacies and technologies, then educators need to question many current practices and assumptions underlying the way they teach. Pedagogy which reflects a convergence between learning by doing and children's preferences for control and freedom to explore, must be more appropriate. Children's levels of expertise from informal settings such as home need to be included in the curriculum in order to further their learning

about computers. Effective integration of technologies rests on teachers' beliefs in computing as essential for the present and their abilities to advance children beyond surface level engagement with the content and meaning of electronic texts.

References

Australian Bureau of Statistics. (1998). *Household use of information technology, Australia Catalogue No 8128.0*. Canberra, Australia: Commonwealth of Australia.

Apple Computer Australia Pty Ltd. (1996). *The impact of computers on Australian home life*. Sydney: Apple Computer Australia, compiled by Elliot and Shannan Research.

Bronfenbrenner, U. (1992). Ecological Systems Theory. In R. Vasra (Ed.), *Six theories of child development* (pp. 187-249). London: Jessica Kingsley Publications.

Buckingham, D. (1993). Just playing games. *The English and Media Magazine, 28*(Summer), 21-25.

Cunningham, H. (1994). Gender and computer games. *Media Education Journal, 17*(Winter), 13-15.

Cupitt, M., & Stockbridge, S. (1996). *Families and electronic entertainment*. Sydney: Australian Broadcasting Authority and the Office of Film and Literature Classification.

Downes, T. (1997). A Matter of equity: computers in Australian homes. *Australian Educational Computing, 12*(2), 7-13.

Downes, T. (1998a) Children's, Parents and Teacher's Discourses about Computers in the Home and School. *Proceedings of the 16th Australian Computers in Education Conference*. Adelaide: CEGSA. also available at http://www.cegsa.sa.edu.au/acec98/acec98.htm

Downes, T. (1998b). *Children's use of computers in their homes*: PhD Thesis. University of Western Sydney.

Gottschalk, S. (1995). Vidcology: Video-games as postmodern sites / sights of ideological reproduction. *Symbolic Interaction, 18*(1), 1-18.

Haddon, L. (1988a) The home computer: The making of a consumer electronic. *Science as Culture*, 2, 7-51.

Hirsch, E. (1992). The long term and the short term of domestic consumption. An ethnographic case study. In R. Silverstone & E. Hirsch (Eds.), *Consuming technologies: media and information in domestic spaces*. (pp. 208-225). London: Routledge.

James, A., & Prout, A. (1990). Constructing and reconstructing childhood, contemporary issues in the sociological study of childhood. London: The Falmer Press.

Lally, E. (1996). *The information appliance. The social construction of the home computer*. Kingswood: Department of Media and Cultural Studies, University of Western Sydney, Nepean.

Livingstone, S., & Gaskell, G. (1995). Children and young people's involvement with old and new media: The 'new' Himmelweit project. In Guglielmelli (Ed.), *Reinventing Television* (Vol. One, pp.

297-319) Association Television et Culture.

Morley, D., & Silverstone, R. (1990). Domestic communication. Technologies and meanings. *Media, Culture and Society, 12*, 31-56.

Murdock, G., Hartmann, P. and Gray, P. (1992) Contextualising home computing resources and practices. In R Silverstone, R. and E. Hirsch (Eds.), *Consuming technologies: media and information in domestic spaces*. (pp. 146-160). Routledge: London

Qvortrup, J., Bardy, M., Sgritta, G., & Wintersberger, H. (Eds.). (1994). *Childhood matters: Social theory practice and politics*. Aldershot: Avebury Press.

Sakamoto, A. (1994). Video game use and the development of socio-cognitive abilities in children: Three surveys of elementary school students. *Journal of Applied Social Psychology, 24*(1), 21-42.

Sefton-Green, J., & Buckingham, D. (1996). Digital visions: Children's 'creative' uses of multimedia technologies. *Convergence, 2*(2), 47-79.

Smith, R., Curtin, P., & Newman, L. (1995). Kids in the kitchen. The educational implications of computer and computer games use by children. A paper presented at the Australian Association for Research in Education Annual Conference, Hobart.

Steinfield, C. W., Dutton, W. H., & Kovaric, P. (1989). A framework and agenda for research on computing in the home. In J. L. Salvaggio & J. Bryant (Eds.), *Media use in the information age* (pp. 61-85). Hillsdale, NJ: Lawrence Erlbaum & Associates.

Valenti, S., & Good, J. (1991). Social affordances and interaction I: Introduction. *Ecological Psychology, 3*(2), 77-98.

Wober, J. M., & Shehina, F. (1994). Age and involvement with computers and their games. *The Psychologist, 7*(12), 553-554.